2 The health of Australians

International comparisons show that Australians enjoy good health, and that the underlying health trends are broadly in step with health improvements occurring elsewhere, particularly in other developed countries (AIHW: de Looper & Bhatia 1998). However, there are significant interpopulation differences in health outcomes within Australia.

This chapter reports on the health status of Australians towards the end of the twentieth century, and the diseases and conditions affecting them.

There are five broad sections:

2.1 Dimensions and components of health describes health using indicators such as life expectancy, self-rated health status, fitness, sexual health, oral health and immunological health.

2.2 Burden of disease and injury outlines aspects of morbidity, disability and mortality in the Australian population. Results from the Australian Burden of Disease and Injury study have been included to describe the contributions made by various diseases and conditions to ill health, disability and premature mortality.

2.3 National Health Priority Area (NHPA) diseases and conditions reviews the burden of diseases and conditions that have been accorded priority status for action by Australian Health Ministers. The diseases and conditions covered are cardiovascular diseases, cancers, injuries, mental disorders, diabetes and asthma.

2.4 Other major chronic diseases and conditions details those chronic, non-communicable diseases that are not currently the focus of the NHPA initiative, but are large contributors to morbidity, disability and mortality in Australia. Some of these diseases and conditions are likely to emerge as major health and wellbeing concerns with the ageing of the population.

2.5 Communicable diseases provides data on various infectious diseases including gastrointestinal illness, HIV/AIDS, sexually transmitted diseases, blood-borne infection, vaccine-preventable diseases and other infections in Australia.

Determinants of health are not discussed in detail here, but are covered in chapter 3. Similarly, the health of various population subgroups in Australia is described in chapter 4.

2.1 Dimensions and components of health

The instinct for survival is the most basic of human traits, and therefore central to any discussion of health. However, a view of health in terms of freedom from disease, with a greater emphasis on body functions and structure, the ability to perform core

activities and participate in society, is likely to provide further insight into variation in health outcomes. This section provides brief overviews of various aspects of health, its dimensions and components.

As well as providing an assessment of life expectancy, there is an overview of health status as rated by Australians themselves. The section also describes various components of health in a modern setting—physical fitness, sexual health, oral health and immunological health.

Life expectancy and longevity

Long life is a cherished goal for most people. For many Australians this goal is highly achievable. Most Australians can now expect to live an average of 80 years, a large proportion of these as healthy years.

Significant increases in life expectancy have occurred throughout the twentieth century. Reductions in infant and child mortality have been the most significant contributors to the increase in life expectancy at birth over the period (ABS 1998c). However, more recently, significant gains in life expectancy occurred following reductions in death rates among the elderly, especially for diseases of the circulatory system, such as heart disease and stroke. These trends have important consequences. Not only do they increase the proportion of the population reaching an advanced age, but they also influence the health, disease and disability patterns in a population.

Longevity is much more valuable if it is accompanied by freedom from suffering, pain or disability. The growing prevalence of chronic diseases and disabilities has brought into focus the need to seek a balance between the length and quality of life (WHO 1997).

Life expectancy in Australia

Most Australians can expect to live relatively long and healthy lives. An Australian boy born between 1996 and 1998 can expect to live, on average, 75.9 years, and a girl born in the same period can expect to live 81.5 years (ABS 1999a). These estimates assume that, over the lifetime of these individuals, the death rates at various ages will not deviate from the rates obtained in 1996–98. However, if the age-specific death rates decrease further, then the life expectancy achieved by these individuals will be more than that estimated from current life tables.

A corollary to the above observation is that at higher ages total life expectancies are greater than those obtained at birth. Surviving early years of life adds years to the balance of life expectancy (Insel & Roth 1988). For example, for males aged 65 in 1996–98, the expected number of remaining years of life is 16.3, a total life expectancy of 81.3 years. For females aged 65 in 1996–98, this figure is 20.0 years or a total of 85.0 years (ABS 1999a).

Life expectancy is not uniform across population groups. Some groups in the population, such as those who are socioeconomically disadvantaged and Aboriginal and Torres Strait Islander peoples, have lower life expectancy than the national average. The most socioeconomically disadvantaged in society, for example, are expected to live about 3 years less than those most advantaged (AIHW: Mathers et al. 1999a). But the

greatest difference is in relation to the life expectancy for Aboriginal and Torres Strait Islander peoples. Indigenous persons born in 1996–98 are expected to live about 20 years less than the rest of the Australian population (ABS & AIHW 1999).

Life expectancy also shows regional variation. Based on 1996–98 data, life expectancy at birth in the Northern Territory was the lowest for both sexes, considerably lower than the overall Australian levels—5.3 years lower for males and 6.5 years lower for females (Table S11, page 371). These differences largely reflect the higher death rates in the Indigenous populations, which constitute a large proportion (29%) of the population in the Northern Territory (ABS 1999a). In other States of Australia, male life expectancy ranges from 75.1 years in Tasmania to 77.5 years in the Australian Capital Territory, and female life expectancy ranges from 80.4 years in Tasmania to 81.9 years in Western Australia.

Life expectancy for both males and females has increased considerably over the last 100 years. Since 1901, life expectancy at birth increased by 38% (from 55.2 years) for Australian males and by 39% (from 58.8 years) for Australian females. Trends in life expectancy are discussed in more detail in chapter 8.

International comparisons

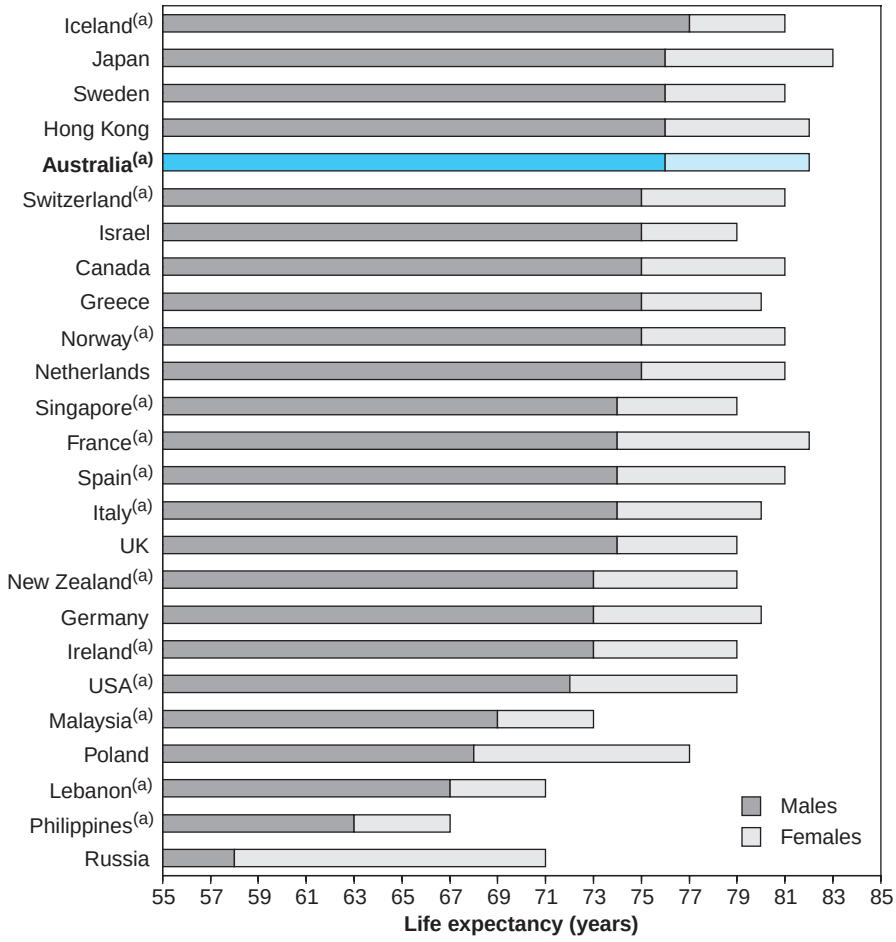
Australians enjoy some of the highest life expectancies in the world. In 1995, the highest male life expectancies at birth were recorded in Iceland (76.5 years) and Japan (76.4 years), and the highest female life expectancies were recorded in Japan (82.9 years) and France (82.6 years). Australian life expectancy at birth is similar to that estimated for countries such as Canada, Norway, Spain, New Zealand, the United Kingdom and the United States (Figure 2.1).

The countries compared in Figure 2.1 are all from more developed regions of the world. The life expectancies of less developed countries are considerably lower. Regions defined by the United Nations as being made up of less developed countries (i.e. countries outside Europe, North America, Australia, Japan and New Zealand) have an overall life expectancy of 64 years, compared with 75 years for developed regions. The African continent has the lowest life expectancy at birth of 52 years (Population Reference Bureau 1999).

Self-reported health

People's perception of their own health has been shown to be a powerful, independent predictor of their survival in several populations (see, for example, Mossey & Shapiro 1982, Kaplan & Camacho 1990, and Idler et al. 1990). Although some inconsistency between the results of different studies suggests that this is not equally true of all populations, Australian studies have demonstrated the link between self-reported health and subsequent health outcomes, at least for older Australians (McCallum et al. 1994).

This section discusses how Australians rate their own health and wellbeing, based on self-assessed health status and the physical and mental health component summary (PCS and MCS) scores derived from the SF-12 questionnaire (Ware et al. 1996—see Box 2.1, page 14). These summary scores were originally developed from the longer SF-36 health survey questionnaire and are intended to represent independent measures



(a) Philippines 1991; Ireland, Italy 1993; France, Iceland, Norway, Spain, USA 1994; Singapore 1996; Lebanon 1990–95; Malaysia 1990–96; New Zealand 1992–94; Switzerland 1994–95; Australia 1995–97.

Sources: ABS 1998c; UN 1998; WHO 1998.

Figure 2.1: Life expectancy at birth, selected countries, 1995

of mental and physical health, with higher scores indicating better health. There is some evidence that results relating to physical health may affect the MCS score and vice versa (see Box 2.1, page 14).

The results presented here are based on data from the 1997 National Survey of Mental Health and Wellbeing of adults (persons aged 18 years and over), conducted by the Australian Bureau of Statistics (ABS).

Box 2.1: SF-12 questionnaire and self-assessed health

The SF-12 questionnaire is a standard international instrument developed by the Medical Outcomes Trust, Boston, USA (Ware et al. 1998). It contains 12 questions that provide a generic measure of self-reported health status.

The responses to various questions can be combined into a physical component summary (PCS) score and a mental component summary (MCS) score. The PCS is taken as representing limitations in physical functioning, role limitations due to physical health problems, bodily pain and general health. The MCS focuses mainly on role limitations due to emotional problems, social functioning, mental health and vitality (Ware et al. 1996).

These summary scores were originally developed from the longer SF-36 health survey questionnaire (Ware et al. 1994). The SF-12 questionnaire was designed as a shorter form of the SF-36 questionnaire; nonetheless it closely reproduces the MCS and PCS scores. Each score has a mean value in the general population of around 50, with a higher score indicating better self-reported health and wellbeing.

There is some evidence that the state of physical health may affect the MCS scores and vice versa, probably because mental and physical health are to some extent interrelated (Simon et al. 1998). However, they still provide useful summaries of self-reported physical and mental health status (Ware et al. 1996).

Self-assessed health was recorded with a question that asked respondents to rate their health according to a 5-point Likert scale (excellent, very good, good, fair, poor).

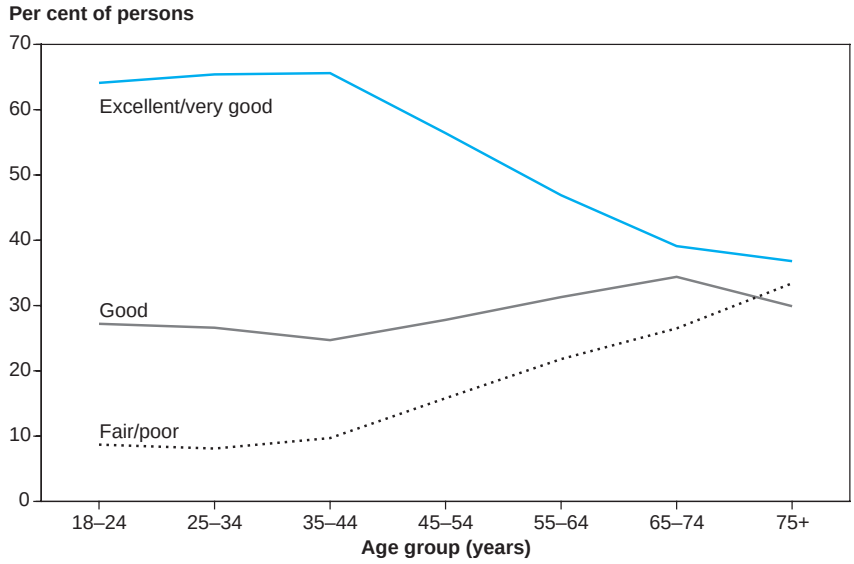
Self-assessed health status

Just over half (57%) of people aged 18 years and over reported their overall health as excellent or very good, and a further 28% reported that they were in good health. Proportions were similar for the two sexes. The remaining 15% rated their health as either fair or poor. In interpreting, these findings, note that some of those in poorer health were excluded from the survey—for example, people living in institutions such as hospitals and nursing homes were not included.

Self-assessed health status is strongly related to age. The proportions reporting excellent or very good, good, and fair or poor health remained relatively unchanged up to the age group 35–44 years. At ages over 44 years, the proportion reporting excellent or very good health declined with increasing age, from 66% at ages 35–44 to 37% at ages 75 and over, while the corresponding proportion reporting fair or poor health increased from 10% to 33% (Figure 2.2).

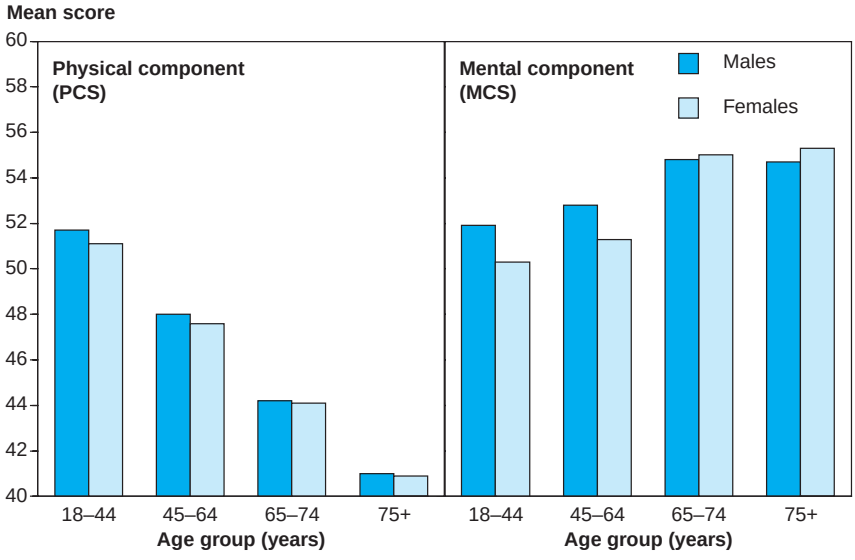
PCS and MCS scores

The PCS score declines steadily with age for both males and females, whereas the MCS score is higher at older ages than at younger ages (Figure 2.3). These patterns suggest that whereas self-assessed physical health declines with age, self-assessed mental health shows improvement. However, these findings should be interpreted with caution since respondents with cognitive problems such as dementia, which mainly occur at older ages, were excluded from completion of the SF-12 questionnaire.



Source: AIHW analysis of National Survey of Mental Health and Wellbeing data.

Figure 2.2: Self-assessed health status by age, 1997



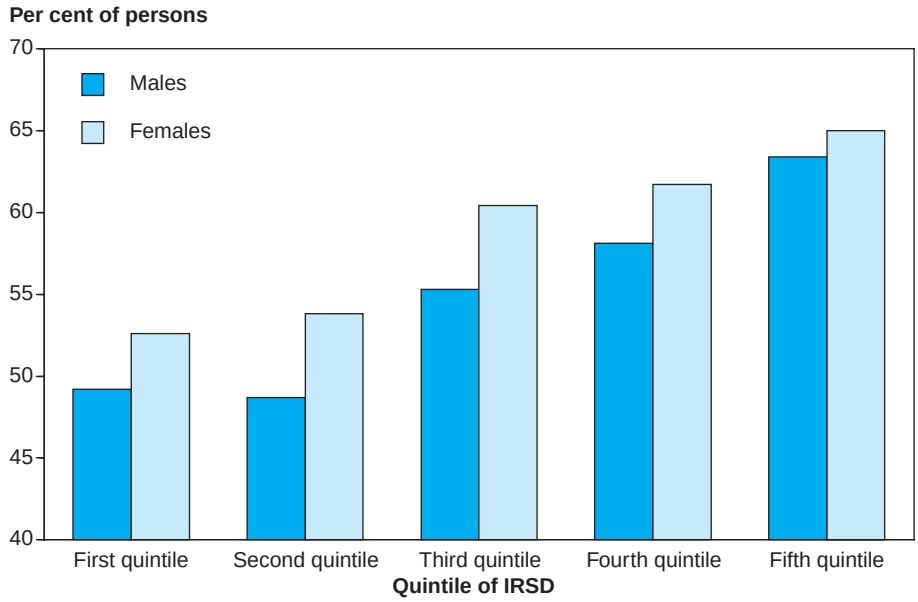
Source: AIHW analysis of National Survey of Mental Health and Wellbeing data.

Figure 2.3: Mean physical and mental component scores by age and sex, 1997

Variation in self-reported health status

The link between health status and socioeconomic status has been clearly demonstrated in studies both in Australia and overseas (Wilkinson & Marmot 1998), with lower socioeconomic status being associated with poorer health. The Australian Burden of Disease and Injury Study shows a clear gradient in the total mortality burden with socioeconomic disadvantage as defined by the ABS's Index of Relative Socioeconomic Disadvantage (IRSD) at the statistical local area level (AIHW: Mathers et al. 1999a). The study also shows a similar marked gradient in the disability burden of mental disorders.

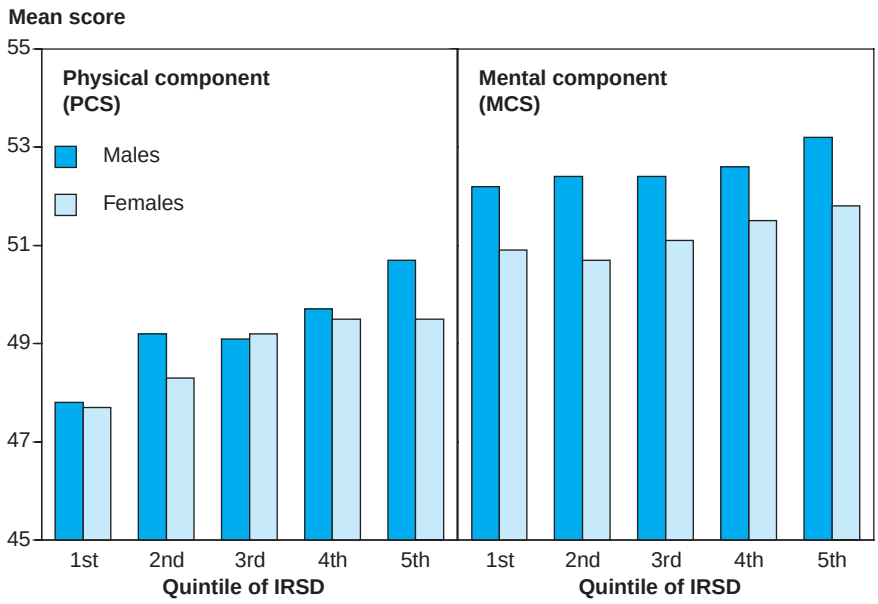
As expected, the proportion of people who reported their health as either excellent or very good shows a marked trend across the socioeconomic disadvantage quintiles. It rises from 49% for males and 53% for females in the first quintile (the most disadvantaged) to 63% for males and 65% for females in the fifth quintile (the least disadvantaged) (Figure 2.4). The pattern of poorer self-assessed health status with increasing disadvantage is also reflected in the mean PCS scores and to a lesser extent in the mean MCS scores (Figure 2.5).



Note: Age standardised to the Australian population at 30 June 1991.

Source: AIHW analysis of National Survey of Mental Health and Wellbeing data.

Figure 2.4: Proportion of people reporting their health as excellent or very good by sex and socioeconomic status, 1997



Note: Age standardised to the Australian population at 30 June 1991.

Source: AIHW analysis of National Survey of Mental Health and Wellbeing data.

Figure 2.5: Mean physical and mental component scores by sex and socioeconomic status, 1997

Fitness

Fitness can be broadly defined as the matching of an individual to his or her physical and social environment. Through a combination of heredity and modifiable lifestyle factors, an individual may acquire the attributes to carry out physical tasks with vigour and alertness, and without undue fatigue in a specified physical, social and psychological environment. This implies that fitness has both physical and mental components that are largely modifiable.

Traditionally, definitions of physical fitness have related only to the physical attributes that are necessary for optimal sport or work performance in terms of an individual's ability in an athletic competition, a performance test or occupation (Pate 1988; Gledhill 1990). Muscular strength, motor skills, power, endurance, body composition, body size, motivation and nutritional status are thus important components of performance-related fitness (Bouchard & Shephard 1994). In recent years, there has been an increasing interest in the health-related aspects of fitness (Bouchard et al. 1997).

Mental fitness involves stimulating the mind through education, work and leisure, and enables people to solve many of the challenges confronted throughout life (Gringold 1999).

Health-related fitness

Health-related fitness has been defined as a state characterised by (a) an ability to perform daily tasks with vigour and (b) traits and capacities associated with a low risk of development of diseases or conditions, where these diseases or conditions are related to a sedentary lifestyle (Bouchard & Shephard 1994).

The relationships between health-related fitness, participation in physical activity and health are complex. Not only does physical activity influence health, but health status also influences participation in physical activity and therefore level of fitness (Bouchard & Shephard 1994). Further, a person's natural (genetic) level of fitness will influence participation, and there is variation among people in their response to the same levels of physical activity (Bouchard et al. 1997). In the general population, both performance-related fitness and health-related fitness decline with increasing age, especially after about age 35 (Smith & Gilligan 1989).

Bouchard and Shephard (1994) have identified several components of health-related fitness: morphological, muscular, motor, cardiorespiratory and metabolic fitnesses (Box 2.2).

Box 2.2: Components of health-related fitness

Morphological component	*Muscular component*	*Motor component*	*Cardiorespiratory component*	*Metabolic component*
Body mass index	*Power*	*Agility*	*Aerobic power*	*Glucose tolerance*
Body composition	*Strength*	*Balance*	*Heart functions*	*Insulin sensitivity*
Subcutaneous fat distribution	*Endurance*	*Coordination*	*Lung functions*	*Blood cholesterol*
Abdominal visceral fat		*Speed*	*Blood pressure*	*Substrate oxidation characteristics*
Bone density				
Flexibility				

Sources: Bouchard & Shephard 1994; Bouchard et al. 1997.

Health-related fitness of Australians

Quantitative information on the health-related fitness of Australians is sporadic. A National Health and Fitness Survey was conducted in 1985 on Australian school children aged 7–15 years (Pyke 1987). More recently, a comparable survey was carried out among New South Wales school children (Booth et al. 1997). The latter study shows that about 25% of boys in Year 6, and around 30% of Year 8 and Year 10 boys, have low aerobic capacity.

Several components of health-related fitness were measured in adults from Adelaide in the Pilot Survey of the Fitness of Australians (DASET 1992). The survey found higher levels of cardiorespiratory fitness, better lung function, and better flexibility and muscle

strength among those who were physically more active. Information on components of health-related fitness has also been collected in the Risk Factor Prevalence Surveys (conducted in 1980, 1985 and 1989) and the 1995 National Nutrition Survey.

Data on the participation of Australian adults in physical activity were collected by the ABS in 1998–99 (ABS 1999f). Although not a measure of fitness, around 15% of adult Australians reported that they had participated in aerobics or fitness activities sometime during the 12-month period prior to interview. Participation of Australians in physical activity for health benefits is discussed further in chapter 3.

Oral health

Oral health refers to the health of a number of different tissues in the mouth, including mucous membrane, connective tissue, blood vessels, nerves, muscles, bone, teeth and periodontal structures. It also covers immunological, physiological, sensory and digestive system aspects of human health. However, the term is used overwhelmingly in relation to two specialised tissues of the mouth, namely the teeth and the periodontal structures or gums.

Many different factors affect the oral health of a population and individual variation therein, prominent among which are age, exposure to fluorides, dietary patterns, preventive dental behaviours, smoking, alcohol consumption, stress, infection and immunity, access to and use of preventive and dental restorative services, and attitudes towards treatment preferences. The oral health of children in developed countries has improved dramatically over the last several decades. Factors such as changes in exposure to fluoride and disease control and management have contributed to this improvement (AIHW: de Looper & Bhatia 1998).

The preservation or loss of teeth and periodontal structures starts early in life, and is a life-long, cumulative process. Early improvements contribute to better outcomes later in life. The loss of all teeth, or edentulism, increases with age, but has been decreasing over time. The numbers of missing teeth in individuals with some natural teeth have also been decreasing. For the individual, the loss of natural teeth is usually associated with chewing difficulties, higher levels of discomfort during eating, personal embarrassment, social isolation and the need for assistance. Decayed teeth are also the cause of much morbidity and pain.

Measurement of oral health

Indicators of oral health may be designed in terms of personal hygiene, dental preservation and/or oral wellbeing, However, the outcomes are usually measured in terms of dental morbidity and mortality such as the number of decayed, missing or filled teeth (DMFT) or edentulism. Because of the highly pervasive nature of dental caries and periodontal (gum) disease, it is necessary to measure not only the prevalence but also the extent and severity of oral diseases.

An increasing proportion of Australian adults are retaining their natural teeth, with recent significant falls in both adult DMFT scores and edentulism, due mainly to effective preventive strategies and changes in disease management. However, both

DMFT scores and the proportion of the population that are edentulous are comparatively high for Australians when compared with other OECD countries (AIHW: de Looper & Bhatia 1998).

Child oral health

The oral health of primary and secondary school children in Australia continues to improve. Oral health in children is most often assessed by their dental decay experience (or extent), expressed as a count of the number of teeth currently decayed, teeth extracted as a result of having been decayed and teeth with fillings. The average number of decayed, missing or filled teeth (dmft) in the deciduous dentition ('baby' or primary teeth) for children aged between 5 and 10 years declined markedly between 1989 and 1996 (Table S26, page 390). Reductions were greatest for the youngest age groups. The average dmft of 5-year-old children reduced by 39.1%, from 2.07 to 1.26, while for 10-year-old children the dmft score fell by 21.8%, from 1.88 to 1.47.

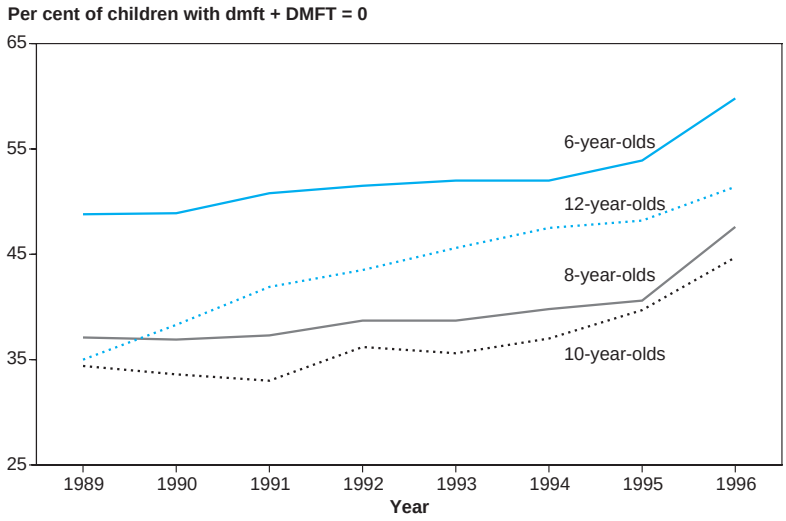
Disease experience in the permanent dentition ('adult' teeth) also declined between 1989 and 1996 (Table S27, page 390). By 1996, the DMFT score for 12-year-old children had reduced by 42.3%, from 1.56 to 0.90. This is a considerable improvement on the average score of 4.79 for 12-year-olds in 1977.

Appreciable differences in disease in the deciduous and permanent dentition exist across Australia's States and Territories, despite the general reduction in the level of disease (Table S28, page 391). The average dmft score for 6-year-old children in 1996 was lowest in New South Wales (0.94) and the Australian Capital Territory (0.89) and highest in Queensland (2.25). In the permanent dentition, average DMFT was lowest in South Australia (0.47) and the Australian Capital Territory (0.56) and again highest in Queensland (1.30). State and Territory differences may be a result of differences in patterns of exposure to preventive factors such as water fluoridation, delivery system organisation, the targeting of oral care and even the methodology used for collecting oral health information. It is notable that, of the major cities in Queensland, only Townsville has fluoridated drinking water (AIHW 1998a).

The changing pattern of children's oral health

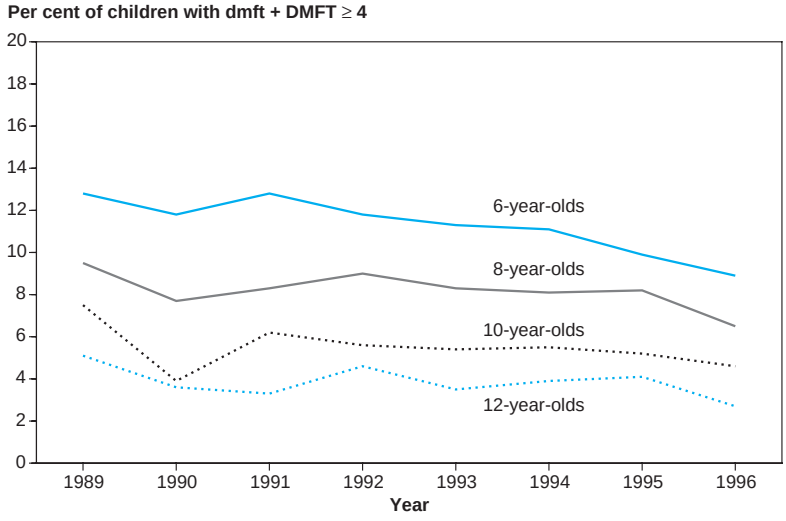
Over the last two decades, there has been a considerable increase in the proportion of children with no caries (tooth decay). Between 1989 and 1996, there was an increase in the percentage of 6-year-old children with no decayed, missing or filled teeth from 48.8% to 59.8%, and the percentage of 12-year-olds with no caries increased from 35.0% to 51.4% in the same period (Figure 2.6). These figures represent an increase of 20.5% and 46.9%, respectively, in the number of 6-year-olds and 12-year-olds without any dental caries at each age.

The burden of oral disease is increasingly concentrated in a minority of children. In particular, there remains a significant proportion of children who present with a considerable history of dental caries (Figure 2.7). The percentage of these high-risk children has decreased only slightly in recent years. For example, the proportion of 6-year-old children with four or more decayed, missing or filled teeth reduced by only 3.7% between 1989 and 1996.



Source: AIHW Dental Statistics and Research Unit Child Dental Health Surveys.

Figure 2.6: Proportion of children with no decayed, missing or filled teeth by age, 1989 to 1996



Source: AIHW Dental Statistics and Research Unit Child Dental Health Surveys.

Figure 2.7: Proportion of children with four or more decayed, missing or filled teeth by age, 1989 to 1996

Children with the largest burden of oral disease are more likely to be of lower socioeconomic status, reside in a rural area or be of Indigenous origin (Davies et al. 1997; Spencer et al. 1998; Gaughwin et al. 1999). In the Northern Territory in 1996, Indigenous 6-year-old children had three times the number of clinically detectable decayed teeth (2.10 on average) than non-Indigenous children (0.73 on average). Therefore, although the caries experience of the general population of children has improved significantly, there remain pockets of at-risk children who require further targeting through oral health initiatives (AIHW DSRU: Armfield et al. 1999).

Oral health of young adults

Gains in oral health made in childhood need to be carried into adult years to continue the improvement of oral health in the general population. Young adulthood may be a period of greater risk of oral diseases as it is a time of change when people move into new accommodation arrangements, relationships become established and economic independence is attained (Young 1996). These changes may alter patterns of preventive health behaviours and treatment service use by young adults. In addition, this age group is noted for its risk-taking behaviours.

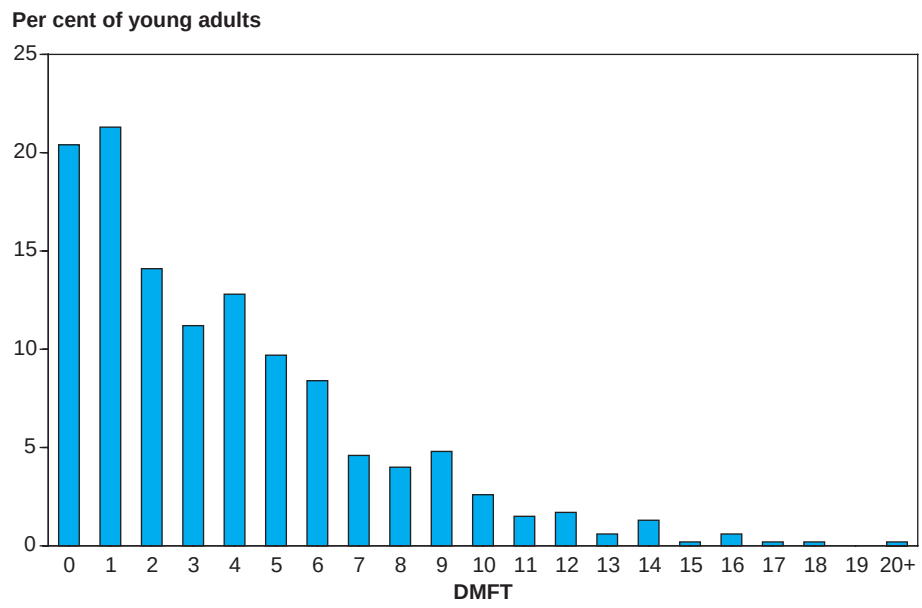
The Adult Dental Programs Survey (AIHW DSRU: Brennan et al. 1995) indicated that publicly funded patients in the 18–24 age group have the highest rates of oral surgery (15% of visits), an average of slightly more than two decayed teeth and the highest rates of temporary restorations (12% of visits), suggesting a strong presence of emergency treatment. Brennan (2000) also found that in private practice extraction rates for dental caries, infections of the tooth root or gum-related diseases were highest in patients aged 18–24 years.

A study in Adelaide in 1999 by Roberts-Thomson and Stewart examined 644 young adults who were selected from the electoral roll. Figure 2.8 shows the distribution of the number of decayed, missing and filled teeth (DMFT) due to dental caries from that study. More than one in five adults (22%) had no clinical evidence of caries. The distribution was positively skewed with a mean DMFT score of 3.66, and a median of 3.0 teeth with caries experience.

However, over 10% of these young adults had a DMFT score of 8 or more. Persons with the highest levels of tooth decay were more likely to be those who were disadvantaged such as concession card holders, those who use public dental clinics, and those who had not visited a dental professional in the previous 2 years.

The mean DMFT of 3.66 was made up of 75% filled teeth, 19% of teeth with untreated decay and 6% of teeth missing due to dental caries. About 29% of the young adults had untreated decayed teeth, with an additional 31% with signs of early decay. Those with untreated decay were more likely to be young adults who usually visit only for a problem, who have not made a dental visit in the last 2 years and who are regular smokers.

Note that the results presented here are from urban Adelaide with access to water fluoridation, and would therefore tend to be an underestimation of national figures. For the majority of young adults, the gains in oral health made in childhood are carried into later years. However, for a minority, oral diseases remain a significant problem.



Source: Adelaide Dental Study of Young Adults.

Figure 2.8: Distribution of dental decay in young adults aged 20–24 years, 1999

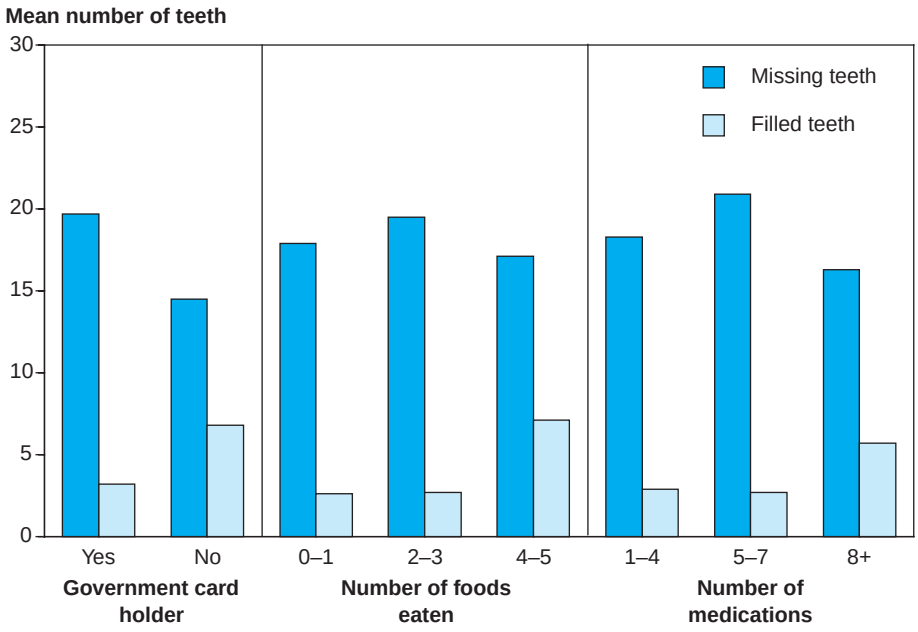
Oral health of nursing home residents

Demographic changes and changing patterns of oral health are resulting in larger numbers of older Australians who are increasingly dentate (have some of their own natural teeth). To provide a better understanding of their oral health, a baseline study of the oral health of nursing home residents was carried out in Adelaide in 1998 (Chalmers et al. 1999). The mean age of participating residents was 83.2 years. Oral inspections were completed for 224 residents.

Two-thirds (66%) of participating residents were edentulous. Edentulous residents had significant oral problems and treatment needs—they had lost a higher percentage of body weight, they could eat fewer foods, their last visit to a dentist was more likely to have been for a problem, and they were less likely to think they needed dental treatment. Denture-related conditions of the mouth were prevalent, such as inflammation of areas of the mouth covered by the denture (16.8%) and inflammation of the corners of the mouth (18.5%). Up to 20% of residents owned dentures that were not worn.

Dentate residents had an average of 11.9 teeth remaining, 18.9 missing teeth, and 1.1 retained roots (0.8 decayed and 0.3 sound retained roots). They had a mean of 1.1 decayed teeth and 3.8 filled teeth, for an average DMFT score of 23.7.

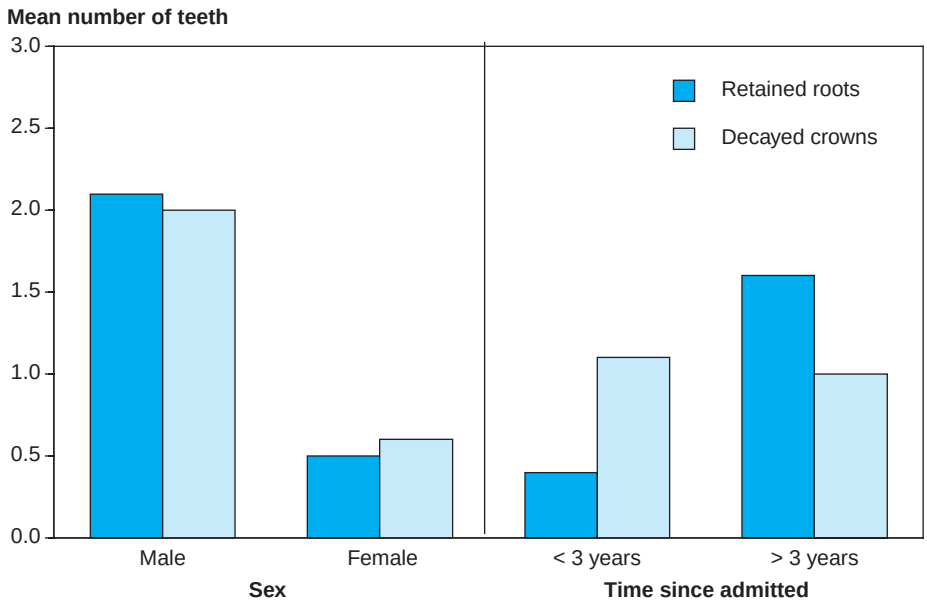
Residents with a government concession card had significantly more missing teeth. Residents without a government card, those taking 8 or more medications and those who could eat most foods had significantly more filled teeth (Figure 2.9). Residents who had been living at the nursing home for more than 3 years had significantly more retained roots. Males had significantly more retained roots and decayed crowns (Figure 2.10). Significantly more plaque/debris-covered surfaces were found in residents who could not eat many foods. Residents with severe cognitive impairment had more decayed teeth, more missing teeth, fewer filled teeth and many more plaque/debris-covered surfaces.



Source: Chalmers et al. 1999.

Figure 2.9: Nursing home residents: tooth status by residents' characteristics, 1998

The prevalence of caries in the crown of the tooth and in the root was high in residents of nursing homes. The mean number of decayed coronal surfaces (1.7) was greater than the number of decayed teeth (1.1), indicating that multiple surfaces were affected on some teeth. The mean number of filled coronal surfaces was 8.7, decayed root surfaces was 1.5, and filled root surfaces was 1.1. Males had significantly more decayed coronal and root surfaces; they also had more decayed root surfaces and significantly higher new caries in crowns and roots. Residents who could not eat many foods had more decayed coronal surfaces, less filled coronal and root surfaces and many more plaque/debris-covered surfaces. More severely cognitively impaired residents had much higher numbers of decayed coronal surfaces.



Source: Chalmers et al. 1999.

Figure 2.10: Nursing home residents: retained roots and decayed crowns by residents' characteristics, 1998

Plaque and tartar (calculus) accumulation was very high on residents' teeth and dentures. Over 25% of dentate and edentulous residents who wore dentures had staining/debris accumulation on more than one-third of the denture surface. Residents with significantly more plaque accumulation were those who could not eat many foods and those who had been admitted to the nursing home more than 12 months previously. Other residents with more plaque were those with a diagnosed dementia and/or severe cognitive impairment, concession card holders, males, younger residents, and the more functionally dependent. Tartar accumulation was high—63% of sites assessed for loss of periodontal attachment had tartar present on probing. Prevalence of mild to moderately deep gum pockets was common, but severe periodontal disease was evident only in a small percentage (4.4%) of residents.

Dentate residents had high treatment needs as determined by a dentist (Table 2.1, page 26). They required a mean of 2.9 surfaces for restoration per resident. Normative need for extractions was high—0.9 teeth per dentate resident. However, less than 25% of residents perceived a need for dental treatment.

Over 30% of dentate residents had unstable and/or unretentive upper dentures and 40% of edentulous residents had unstable and/or unretentive lower dentures. Over 20% of dentate residents had defects with their upper partial dentures. However, residents' perceived need for denture treatment was much lower than the normative

Table 2.1: Nursing home residents: dentate residents—treatment needs determined by dentist, 1998

Type of treatment	Mean number of teeth requiring treatment
Restorations	
For 1 surface	0.97
For 2 surfaces	0.41
For 3 surfaces	0.30
For 4 surfaces	0.04
Extractions	0.87
Preventive	0.33

Source: Chalmers et al. 1999.

need. For example, based on clinical criteria, 68% of residents who required a new full denture did not want it and 50% of residents who required a denture reline did not want it.

Sexual health

Sexuality is integral to physical and mental health. In addition to its reproductive function, it influences a broad range of attitudes and social values. Sexual health, therefore, refers not only to the health of reproductive organs but also to the psychological, emotional and relationship aspects of sexual behaviour.

Attitudes to sexuality, in particular to the reproductive purpose of sexual behaviour, have changed considerably over the last several decades. Two major factors contributing to this change are improved methods of, and greater access to, contraception. Social and economic factors have also influenced the association between sexual activity and reproduction.

For most people, sex is a positive and normal aspect of life. It is a means of reproduction, as well as providing intimacy in relationships. For others, who experience sexual dysfunction, sexual intimacy can be difficult and lead to emotional and relational problems. There is also the problem of sexually transmitted diseases (STDs) or unwanted pregnancy that can result from unsafe sex practices.

This section provides an overview of the sexual health of Australians, relating to reproduction and contraception, sexual health status, sexual dysfunction and STDs. The section on communicable diseases later in this chapter provides additional information on STDs. Chapter 3 describes sexual health practices in Australia and associated risk factors. The section on mothers and babies in chapter 4 covers the issues of pregnancy, multiple births, abortion and perinatal deaths in greater detail. Information on healthcare services in relation to sexual health in general, and reproduction in particular, is included in chapter 5.

Reproduction

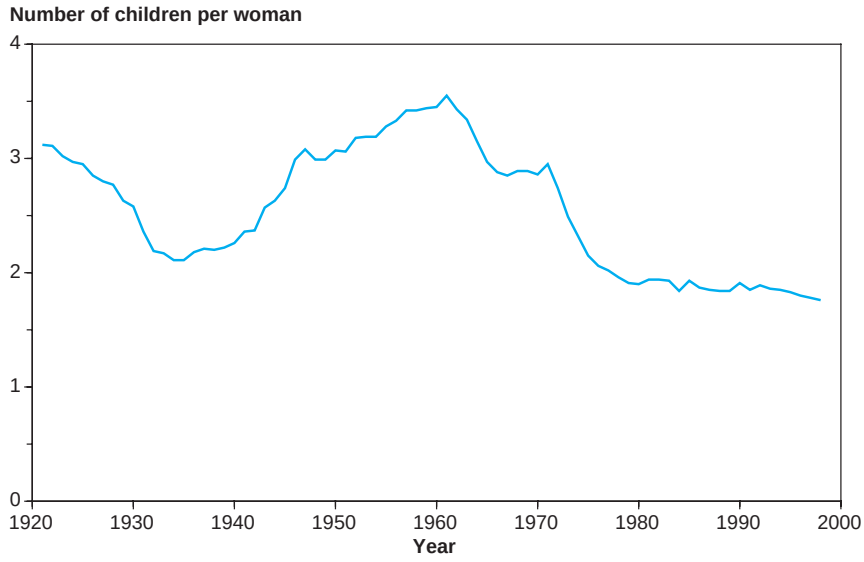
An important goal for many people is to have a family. However, the timing of starting a family and the size of the family has changed substantially over the last 100 years. A wide variety of contraceptive methods makes it possible for couples and individuals to plan the number and timing of children.

In 1998, around 246,000 women gave birth in Australia, with almost 250,000 live births registered (the difference takes into account multiple births). The outcome of some pregnancies is the birth of a stillborn child. A total of 1,336 stillbirths were registered in 1998 (ABS 1999c, 1999d). Crude birth rates have declined from 21.7 per 1,000 people in 1971 to 13.3 per 1,000 in 1998.

Medical assistance such as in-vitro fertilisation (IVF) and gamete intrafallopian transfer (GIFT) have made it possible for people with fertility problems to have children. In 1997, almost 3,500 births were the result of assisted conception. This was an increase of 9.3% over the number of assisted-conception births in 1996 (AIHW NPSU: Hurst et al. 1999).

Fertility

The average number of births per woman (the total fertility rate) has been declining in Australia since the peak in 1961 (3.6 babies per woman). This is likely to be due to the greater control women and men now have over reproduction. By 1998, the total fertility rate had dropped to 1.76, below the replacement level of 2.1 babies per woman (Figure 2.11).



Source: ABS Cat. No. 3301.0 (various years).

Figure 2.11: Total fertility rate, Australia, 1921 to 1998

As well, child-bearing is being delayed until later in life. Major declines in the fertility rate over the period 1978 to 1998 occurred among younger women. Births to teenage mothers decreased by 38% over the period, to a rate of 18 births per 1,000 women aged 15–19 years. Over the two decades the fertility rate for women aged 20–24 years declined by 48%, and for women aged 25–29 years by 23%. Conversely, between 1978 and 1998, the fertility rate for women aged 30–34 years increased by 46%, and for women aged 35–39 years by 94% (ABS 1999c).

Changes in fertility are a result of the interaction of many social and economic factors, as well as health factors. These issues are beyond the scope of this report, but are discussed in *Australia's Welfare 1997* (AIHW 1997).

Contraception

Contraception is recognised as a preventive health measure because it offers protection against unwanted pregnancy.

Contraception methods are many and varied, and can be classified as non-surgical or surgical. Non-surgical methods include withdrawal or periodic abstinence (rhythm or natural method), condoms, the contraceptive pill, diaphragm, spermicides, douche, and intra-uterine devices (IUD). Surgical methods are tubal ligation or hysterectomy in women and vasectomy in men. Although the number of vasectomies has remained steady over the past decade, the number of tubal ligations has dropped (Figure 2.12).

The 1995 National Health Survey found that almost 40% of women aged 18–49 years used the oral contraceptive pill, 19% used sterilisation and another 18% used condoms for contraception (ABS 1998d).

Not all contraception methods are infallible. Sterilisation has the lowest failure rate (0.3%), followed by modern reversible methods such as IUD (4.4%) and traditional methods such as periodic abstinence, withdrawal, diaphragm and condoms (16.4%) (Handelsman 1995).

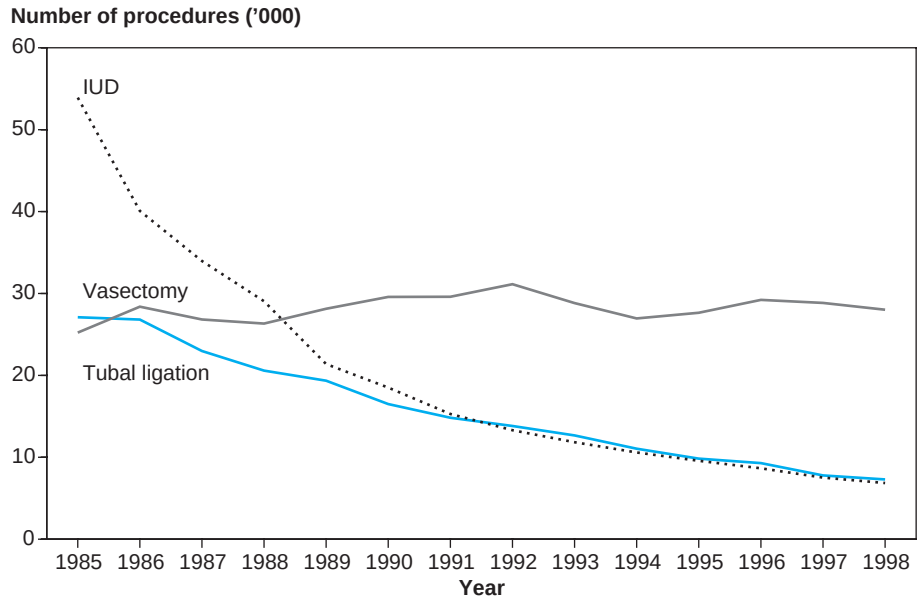
Sexual health status

Sexual health status refers to the health of reproductive organs and problems relating to pregnancy, the prevalence of sexual dysfunction and STDs.

Health of reproductive organs and pregnancy

In 1998–99, the Bettering the Evaluation And Care of Health (BEACH) survey found that female genital system problems accounted for 4.3% of the total number of health issues managed by general practitioners (GPs). Most of these visits were for genital check-ups or Pap smears (28%) and menopausal complaints (24%). Consultations relating to pregnancy and family planning accounted for 2.8% of all health issues managed. Such problems include pre/postnatal check-ups and consultations relating to oral contraception. Male genital system problems accounted for 1% of all health issues managed by GPs.

Statistics on hospital separations provide some information on morbidity related to reproductive organs (both male and female), as well as complications of pregnancy. There were 185,183 separations for diseases or disorders of the female pelvic organs and genital tract (3.3% of all separations), with an average length of stay of about 2 days, in



Source: Commonwealth Department of Health and Aged Care, unpublished data.

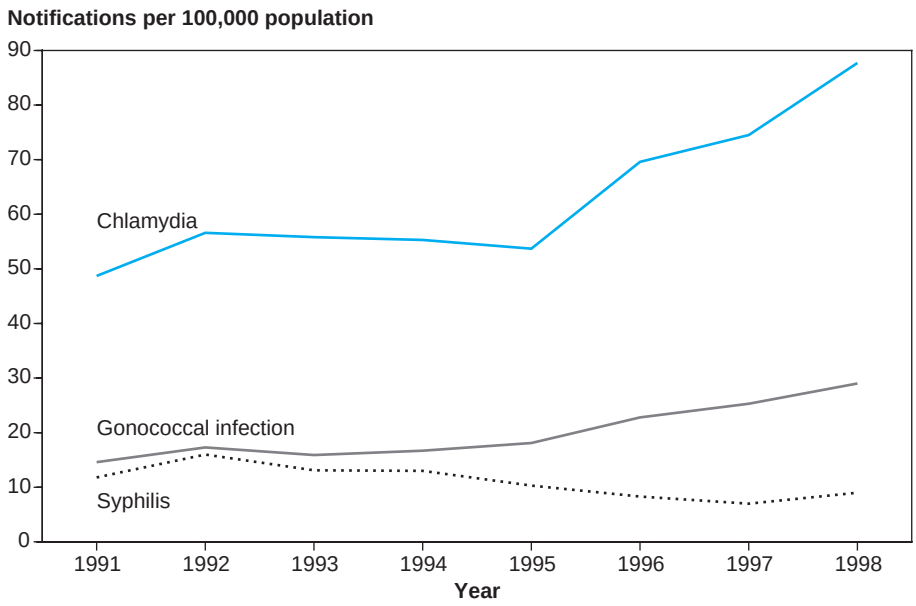
Figure 2.12: Contraceptive medical procedures, 1985 to 1998

1997–98. There were 213,378 separations related to labour and delivery, 135,589 separations due to complications of pregnancy, 9,154 for complications of the puerperium and 76,013 separations for pregnancy with an abortive outcome during that period. Diseases of male genital organs accounted for 45,166 separations and an average length of stay of about 3 days (AIHW 1999b).

Sexually transmitted diseases

Many STDs are notifiable on a national basis, which means that any diagnosis of the disease must be reported to the relevant State/Territory authorities. These reports are then provided to the Commonwealth through the National Notifiable Diseases Surveillance System (NNDSS). The diseases classified as sexually transmissible for surveillance in the NNDSS are chancroid, chlamydial infection, donovanosis, gonococcal infection, lymphogranuloma venereum and syphilis. Trends in the annual number of notifications for chlamydia, gonococcal infection and syphilis are shown in Figure 2.13, page 30. Trends in HIV infection and AIDS are discussed in section 2.5.

Chlamydia is the highest reported STD, and is among the top five notifiable diseases in Australia. In 1998, a total of 11,405 notifications were received for chlamydial infection, a rate of about 88 cases per 100,000 population. The highest prevalence was recorded in the age group 20–24 years, with 60% more notifications for females than males. The



Sources: Herceg et al. 1996; Thomson et al. 1999.

Figure 2.13: Trends in STD notifications, 1991 to 1998

incidence of chlamydia has been increasing over time, with an 80% increase in the rate between 1991 and 1998. However, this increase may reflect increased rates of testing and notification rather than any actual rise in prevalence.

Notifications of gonococcal infection have also increased over this period. In 1998, there were 5,428 notifications of gonococcal infection to NNDSS. The notification rate of 29 per 100,000 was higher than in recent years but still far below the rates recorded in the 1970s and early 1980s (Thomson et al. 1999). Notification rates were the highest among the age groups 15–19 and 20–24 years, and there were 50% more notifications for males than for females.

A total of 1,689 notifications of syphilis were received in 1998, a rate of 9 per 100,000 population. This is a 29% increase in the rate compared with 1997, and a reversal of the underlying trend since 1992.

Other important diseases that are commonly or usually spread by sexual contact include genital herpes, genital warts, trichomaniasis and parasitic infestations such as pubic lice. However, these diseases are not subject to national notification. No information on their incidence is available.

Knowledge

Knowledge about the importance of contraception and protection against STDs is perhaps most important for young adults, because this is the stage when most people become sexually active and some have children. However, note that although having the knowledge is necessary, it does not ensure that an individual will engage in safer sexual practices.

Information on the knowledge that young people have about STDs is available from a nationally representative sample survey of 3,550 students (Year 10 and Year 12) conducted in 1997 by the Centre for the Study of Sexually Transmissible Diseases at La Trobe University. Earlier, in 1992, the National Centre in HIV Social Research had conducted a survey on the issue. The 1997 study found that there has been a shift over the 5 years towards safer sexual practices, with significantly more young people using condoms and having sex with fewer partners than in 1992. The survey also found that condoms were the most common method, but substantial numbers of students were using the pill, with some falsely believing that the pill also protects them against STDs (Lindsay et al. 1997).

Education programs have been successful to the extent that young people are highly informed about the transmission of HIV/AIDS. However, knowledge about other STDs and blood-borne viruses is low. A most disturbing observation is that many students do not see themselves at risk of becoming infected with an STD. A substantial minority of young people continue to engage in high-risk practices such as having unprotected sex with casual partners; it is estimated that 4% never use condoms with casual partners and 28% use them only sometimes (Lindsay et al. 1997).

Immunological health

The immunological health of an individual depends on the body's ability to recognise and effectively counter infection. People cannot survive without a functioning immune system. The immunological mechanisms also contribute to or control a range of other health outcomes. Several primary prevention strategies take advantage of these mechanisms to improve immunological health, both at an individual level and at a population level.

Of the many defences that the human body has against infections, the most basic are those that prevent the entry of micro-organisms into the body. These include the skin and mucous membranes, and the secretions they produce which contain antimicrobial proteins. Despite this, some micro-organisms manage to enter the body either directly through wounds, sexual intercourse, breastfeeding, the placenta and blood transfusion, or indirectly through contaminated food and water, infected insects and animal contact.

Following contact with an infectious micro-organism, the immune system protects the body with an array of defences (see Box 2.3, page 32). The immunity developed following recovery from an infection is known as naturally acquired immunity. This is also known as active immunity, because it depends on an active response by the body's own immune system.

Box 2.3: Development of immunity

The body protects itself against the entry of microscopic organisms with the skin, and with chemicals exuded by the skin and by mucous membranes. If an infectious agent gets past these barriers, it then encounters two cooperative defence mechanisms, non-specific and specific immunity.

Non-specific immunity

Non-specific immunity depends mainly on white cells such as neutrophils and macrophages which are involved in phagocytosis (cell eating), and on natural killer cells which are particularly important in the defence against viruses. The body also possesses a variety of proteins capable of antimicrobial activity such as complements and interferons which assist in the defence process.

Non-specific immune responses often involve an inflammation. An injury to tissue causes chemical signals resulting in an increased flow of blood to the area and increased permeability of the blood vessels, thus allowing phagocytes to leave the blood and enter the infected area. The area around the injury becomes inflamed (hot and red). The pus that is often seen in an infected injury is mainly dead cells and fluid leaked from small blood vessels. An inflammatory response can involve the whole body. In severe infections injured cells emit chemicals which cause the body to produce large numbers of white blood cells. Some white blood cells produce pyrogens, molecules that raise the body's temperature. A moderate fever inhibits the growth of some infectious organisms and speeds up the phagocytic processes described above. However, a very high fever may cause complications.

Specific immunity

The immune system learns how to distinguish between self and non-self early in its development. Each kind of micro-organism, be it a virus, a bacterium, a fungus or a parasite, contains macromolecules known as antigens. The body responds to these antigens in two ways.

The first way is by what is called cellular immunity, in which white blood cells known as T lymphocytes destroy organisms carrying that particular antigen. The second way is by humoral immunity, in which white blood cells known as B lymphocytes produce antibodies. These antibodies bind to the antigen, and neutralise or inactivate the infectious micro-organism. This mechanism also makes it easier for phagocytes (see above) to ingest them. Antibodies defend the body against toxins and free bacteria and viruses found in body fluids, whereas T lymphocytes defend the body against bacteria and viruses living inside human cells as well as against fungi and parasites (Campbell 1993).

Each antigen stimulates the production of a unique, appropriate immune response. In addition, the immune system has a great diversity of lymphocytes and this enables it to respond rapidly to many different types of micro-organisms. Furthermore, as people grow older and over the years become exposed to a wider range of infectious micro-organisms, the immune system develops memory. If the body encounters the same infectious organism again, it is able to produce a quicker and stronger immune response to that antigen. The individual will then suffer only a mild illness or have no symptoms at all. A person who experienced an infection with a certain pathogen but shows no clinical symptoms on renewed exposure to this pathogen is said to be naturally immune to that infection.

Disease protection

The health outcome of an infection is influenced by many factors. These include the ability of the micro-organism to produce disease among those exposed, the level of severity of the disease it causes, the actual number of micro-organisms the person is exposed to, and the level of natural or induced immunity in the host (Beaglehole et al. 1998). An infection does not necessarily lead to illness. The great majority of micro-organisms to which people are exposed cause only mild symptoms or discomfort. There is, however, a minority of organisms, such as those causing measles or cholera, which can lead to severe illness and death if introduced into the body.

The problem with natural immunity as a protection strategy against certain infections is that some or many people will die of the disease caused by the infection. Only those who survive the illness (mild or severe) would have acquired natural immunity. Immunity, however, can be acquired artificially by the use of vaccines made from killed, weakened or only small parts of the microbes that cause infection (Box 2.4, page 34). In this way, a person can become immune to disease-causing micro-organisms without having to suffer illness.

Vaccination, however, is not without its risks. Although rare, some people may have a severe reaction to a vaccination. However, at a population level, the risks of severe and debilitating illness or death from the disease itself if people are not vaccinated are much higher than the risk of an adverse reaction to a vaccine. For example, it is known from experience that 1 in 25 children infected with measles will develop pneumonia and 1 in 2,000 will develop encephalitis (brain inflammation) (NHMRC 1997b). Of the children who develop encephalitis, 10% will die and 40% will suffer permanent brain damage. In addition, about 1 in 25,000 will develop subacute sclerosing panencephalitis (SSPE, brain degeneration), a rare late complication of measles infection that is fatal (Elliott et al. 1999). But for every million children vaccinated against measles, only one child may develop encephalitis as an adverse reaction to the vaccination (NHMRC 1997b).

Immunity in the form of antibodies can also be transferred from one individual to another, and this mechanism is known as passive immunity. This occurs naturally when antibodies pass through the placenta from the mother to the foetus. Although these antibodies last only for a few months, they nevertheless protect the infant against diseases that the mother has been exposed to and possesses antibodies against. This source of antibodies, together with antibodies in breast milk, is important in protecting the infant from infections during the early months of life.

Herd immunity

If a large proportion of individuals in the population is immune to a particular infectious disease, then the general level of immunity in the population becomes sufficiently high to minimise the spread of infections. Even if a small proportion of the population is not immune—i.e. they remain susceptible to the disease—their risk of infection is much reduced because they are less likely to be exposed to the organism and less able to pass it on to others. This outcome is called herd immunity.

Box 2.4: Vaccination

Vaccines are either whole preparations of the infectious or toxic agents that have been killed or modified (attenuated) so that they will not cause the disease, or antigen preparations from an infectious agent that have been purified (subunit vaccines). The immune system may respond to this modified material resulting in immunological memory of that particular organism. This immunity will protect the body on a subsequent encounter with that infectious agent. Active immunisation has contributed to the control of nine major infectious diseases which previously killed large numbers of children and adults: smallpox (completely eradicated), diphtheria, tetanus, yellow fever, pertussis (whooping cough), polio, measles, mumps and rubella (Moxon 1990).

A way of urgently but temporarily protecting against disease is through passive immunisation. Antibodies can be transferred artificially from an individual or animal that has been already vaccinated against the disease to a person who is in danger after being infected. Tetanus in humans can be treated in this way because the infection can develop rapidly and protection from a normal vaccination would take too long. The protection produced by passive immunisation is immediate but lasts only a few weeks.

The protection offered by a vaccine (vaccine efficacy) is measured in clinical trials where one group is given the real vaccine and another group (the control group) is left unvaccinated. Vaccine efficacy is the percentage reduction of the incidence of the disease among the vaccinated compared with the unvaccinated or control group (Giesecke 1994). The term 'vaccinated' refers to those who are injected with the vaccine, whereas 'immunised' refers to those in whom the vaccine actually brought about an immune response (NHMRC 1997b).

It has been possible to develop effective vaccines against many important microbial diseases. Difficulties are encountered in the development of vaccines against several diseases caused by parasites. Some of the obstacles are due to the complex life cycles of protozoan parasites, and others are related to evasion mechanisms of the infectious microbes. These include genetic variability of the organism and variability in the structure of its antigens that would be targets of immune response mechanisms (influenza and HIV). In addition, some parasites mimic host tissues to evade destruction by the immune system.

If everyone or almost everyone in a population is immune or protected against disease, it is possible to eradicate the disease completely. For example, as a result of a large and extensive campaign of vaccination throughout the world, the infectious agent causing smallpox was completely eradicated. An immunisation coverage of 90% to 95% is, however, required to interrupt transmission of highly infectious diseases (Lister et al. 1999).

Herd immunity can be lost if an increasing proportion of the population does not become immune. If a large pool of unprotected individuals exists, they can transmit the infection and an outbreak or epidemic can occur as a result. Since some people either cannot be vaccinated because of their medical condition or decline immunisation perhaps because of their beliefs, it is important that as many people as possible are vaccinated so that the herd immunity is maintained (Box 2.5).

Box 2.5: Immunisation strategies

A knowledge of vaccine potency (efficacy), the duration of its effectiveness, factors influencing the spread of infectious agents within a population and herd immunity all influence immunisation strategies used against different diseases. Strategic issues include the proportion of the population to be vaccinated and the age at which they should be vaccinated. In general, the higher the infectivity of a micro-organism (reproductive potential), the greater the degree of coverage needed to generate and maintain herd immunity.

Other factors taken into account in developing immunisation strategies include the costs and benefits of immunising people and an assessment of the risks if a person becomes infected. For example, diphtheria and pertussis (whooping cough) cause high mortality and serious consequences and only people vaccinated against them are protected. Vaccines against diphtheria and pertussis are safe, highly effective and produce long-lasting immunity. Thus the immunisation strategy for the two diseases is that everyone should be immunised.

In contrast, vaccines against cholera offer only short-term and incomplete protection. Cholera is a serious disease, but in healthy people is rarely fatal, although it can kill children and old people. Cholera is spread by poor sanitation and water supply, uncommon problems in Australia. Cholera immunisation is therefore not routinely recommended in Australia.

Many other diseases present risk to only certain individuals or groups in the population. In Australia, these include meningococcal disease, pneumonia, influenza, hepatitis A, Q fever and tuberculosis (NHMRC 1997b). Vaccination is recommended only for aged people, healthcare workers, people with malfunctioning immune systems and those chronically ill, i.e. people at increased risk of becoming infected or of suffering severe illness if they do.

Other vaccines are used to protect travellers against diseases that they are only likely to come into contact with outside of Australia. These include vaccines against cholera, Japanese encephalitis, typhoid, yellow fever, rabies and bat lyssavirus infections. When Australian travellers are protected against infection, the Australian resident population is also protected because vaccinated travellers are less likely to bring the infections back into the country where they could spread further.

Vaccines used in the standard schedule of immunisation in Australia are diphtheria, tetanus, pertussis, measles, mumps and rubella, polio, Haemophilus influenzae *type B (Hib) and hepatitis B (NHMRC 1997b). All these vaccines are highly effective (range 84% to 100%) (Hall 1998).*

Monitoring immunisation levels

The herd immunity of a population can be monitored in several different ways. The most useful indicator is an assay for antibody levels. This type of information is not currently collected in Australia nationally. Another indicator of herd immunity is the extent of the immunisation coverage. Although Australia has had a childhood immunisation program since the 1920s, information on coverage was less than satisfactory until the establishment of the National Notifiable Disease Surveillance Scheme (NNDSS) in 1991 and the Australian Childhood Immunisation Register (ACIR) in 1996 (Lister et al. 1999).

Before the establishment of ACIR, which collects information directly from providers, the ABS collected information on immunisation coverage by asking parents whether their children had been vaccinated. The most recent ABS data suggest that only 52% of children aged 0–6 years are fully immunised for their age, excluding *Haemophilus influenzae* type B (Hib), 46% are partially immunised and the remaining 2% are either not immunised or their immunisation status is unknown (ABS 1996a). Vaccination coverage also varied by type of vaccine, age, State, socioeconomic status and country of origin.

Reliable ACIR data will not be available until 2001 but preliminary analysis indicates that the ABS surveys probably overestimate the degree of vaccination coverage (McIntyre et al. 1998).

Allergies, auto-immunity and immunodeficiency

High-quality immunological health requires fine regulation of the body's immune system. In certain circumstances, however, the immune system may overreact to certain antigens giving rise to allergies such as asthma. In other cases, and for reasons not yet well understood, the immune system may fail to recognise the difference between the body and the foreign agent, i.e. self and non-self, and react against the body cells leading to a variety of auto-immune diseases. Examples include Type 1 diabetes and rheumatoid arthritis. Lack of effective immune functioning also results from a variety of immunodeficiencies such as AIDS.

There is a growing body of evidence that physical and emotional stress, including depression, can reduce natural immunity (Olff 1999). This can happen either through direct transmission of signals from the nervous system to the immune system, or through hormones produced during stress and during pregnancy which can adversely affect the immune system. It would appear that a sense of wellbeing and security, including good mental health, mediated through the immune system, has beneficial effects for health in general.

Allergies

Allergic reactions can occur to such things as wasp and bee venom, particular drugs, certain foods, plants, dust mites and pets or other animals. These substances are called allergens. For example, hay fever occurs when the immune system reacts to pollen allergens and becomes sensitised. Later exposure to the same allergen will cause a rapid and vigorous immune response that includes the release of histamines and other chemicals. The body's reaction to histamines causes the symptoms of the allergy, sneezing, a runny nose and tears. If a reaction occurs in the tissues of the respiratory tract, it can cause smooth muscle contraction leading to breathing difficulties (Kay & Lessof 1992).

Allergies are also believed to be involved in the development of asthma, an increasingly serious disease in Australia (Robertson et al. 1991). It is possible that allergens play an important role in the sensitisation and persistence of T cell subsets responsible for causing and maintaining the asthmatic condition. These cells occur in the lungs, and continued exposure to allergens results in an immune response that causes the obstruction of airflow in the lungs during an asthma attack (Kay 1997).

The rapid increase in asthma in developed countries has led some experts to suggest that the absence of infections in childhood, due to improved hygiene and effective childhood immunisation, is responsible for the persistence of an early life, immature immune response. This is particularly the case in genetically susceptible individuals (Abramson & Walters 2000).

Auto-immunity

The failure of the immune system to distinguish between self and non-self leads to a variety of auto-immune diseases, including:

- systemic lupus erythmatosus, in which people develop immunity against nucleic acids released by the breakdown of normal cells (Bach & Koutouzov 1997);
- rheumatoid arthritis, a crippling disease in which the immune system attacks the cartilage and bone of joints;
- Type 1 diabetes, which results from the destruction of the insulin-producing cells of the pancreas;
- rheumatic fever, where antibodies against streptococcus also react with heart muscle, damaging heart valves; and
- multiple sclerosis, believed to be caused by auto-immune responses to certain components of the nervous system.

The incidence, prevalence, morbidity and mortality associated with auto-immune diseases are difficult to establish. These diseases may share a common aetiology, but are expressed in a diverse range of illnesses and outcomes. A wide range of information is collected on epidemiological aspects of these diseases, but the degree to which they are classified as auto-immune in administrative collections varies. No consistent categorisation of auto-immune diseases occurs, and this may underestimate their burden on the community.

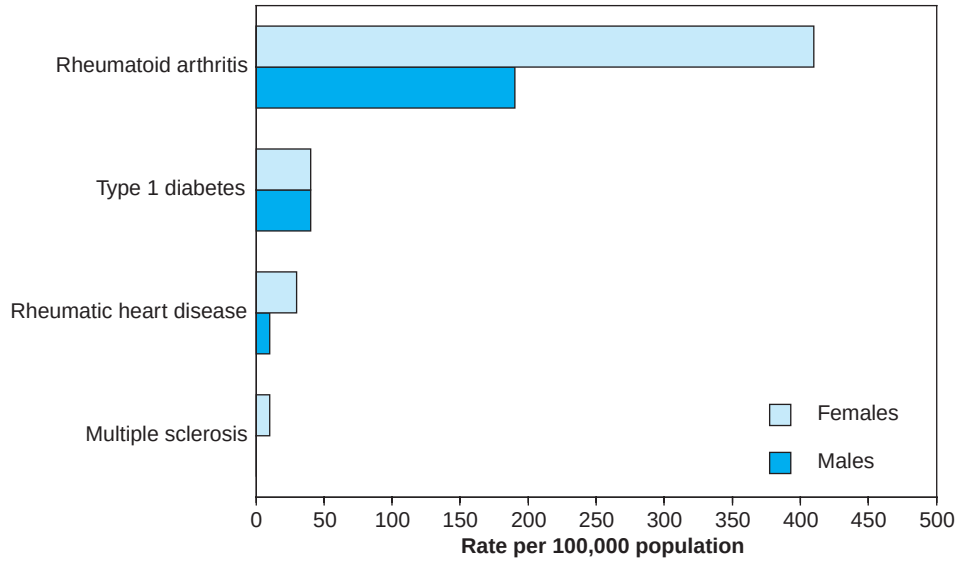
Auto-immune diseases are responsible for significant illness, disability and activity restriction in Australia. A major impact of these diseases is disability rather than premature mortality. With the exception of Type 1 diabetes, auto-immune diseases are more highly prevalent among females than males (Figure 2.14, page 38), and this difference is reflected in hospital separation and mortality statistics (Table 2.2).

Table 2.2: Hospital separations (1997–98) and deaths (1998) for selected diseases and conditions with large auto-immune components

		Hospital separations		Mortality	
Condition	**ICD-9 code(s)**	**Males**	**Females**	**Males**	**Females**
Type 1 diabetes*	250	5,974	5,628	—	—
Rheumatic heart disease	390–398	764	1,308	87	171
Rheumatoid arthritis	714	1,603	4,080	29	106
Multiple sclerosis	340	771	2,224	31	63
Systemic lupus	710.0	208	873	10	44

* Type 1 diabetes is not coded separately in mortality collections.

Sources: AIHW National Morbidity Database and AIHW National Mortality Database.



Sources: AIHW National Morbidity Database; AIHW: Mathers et al. 1999a.

Figure 2.14: Prevalence of selected auto-immune conditions, 1996

Immunodeficiency

Immunodeficiency arises through a variety of mechanisms. Some people are born with defective immune systems. In other cases, cancerous cells may suppress or damage the immune system. Some micro-organisms attack the immune system itself, leaving it unable to protect the body against other micro-organisms. A good example of the latter is infection with HIV, which causes weakness of the immune system leading to AIDS. When damage to the immune system reaches a certain point, cellular immunity collapses and opportunistic infections and diseases such as Kaposi's sarcoma and pneumocystis pneumonia can kill the host.

2.2 Burden of disease and injury

The burden of disease refers to the impact on 'healthy' life of illness, injury, disability and premature mortality. Illnesses and conditions present in Australia are described, including estimates of their incidence and prevalence, using a range of data sources. The section on mortality describes trends in death rates by cause of death and identifies the contributions made by major diseases. A further section presents the results of the Australian Burden of Disease and Injury Study which combined information from various aspects of disease and injury into a single measure, disability-adjusted life years (DALYs).